

WHAT IS CLAIMED IS:

1. In a semiconductor laser light emitting device comprising:

a stacked film composed of a stack of group III nitride semiconductor films each containing at least one kind selected from aluminum, gallium, indium, and boron;

wherein an upper portion of said stacked film is formed into a ridge-like stripe, to form a current injection region;

a current non-injection region formed on both sides of said ridge-like stripe; and

at least part of said current non-injection region is made from a material expressed by a chemical formula  $\text{Al}_x\text{Ga}_{1-x}\text{N}$  ( $0 \leq x \leq 1.0$ );

the improvement wherein

the component ratio "x" of Al is specified at a value in a range of  $0.3 \leq x \leq 1.0$ , so that said semiconductor laser light emitting device is configured as an index guide type semiconductor laser light emitting device.

2. A semiconductor laser light emitting device according to claim 1, wherein a current injection width  $W_{st}$  of said current injection region is specified at a value in a range of  $1 \mu\text{m} \leq W_{st} \leq 3 \mu\text{m}$ .

Sub B7

3. A semiconductor laser light emitting device according to claim 1, wherein part, present between an active layer and said current non-injection region, of said stacked film under said current non-injection region at least includes a film which is made from a material expressed by a chemical formula  $\text{Al}_x\text{Ga}_{1-x}\text{N}$  ( $0.3 \leq x \leq 1.0$ ) and which has a thickness of  $0.2 \mu\text{m}$  or less.

4. A semiconductor laser light emitting device according to claim 2, wherein part, present between an active layer and said current non-injection region, of said stacked film under said current non-injection region at least includes a film which is made from a material expressed by a chemical formula  $\text{Al}_x\text{Ga}_{1-x}\text{N}$  ( $0.3 \leq x \leq 1.0$ ) and which has a thickness of  $0.2 \mu\text{m}$  or less.

5. A semiconductor laser light emitting device according to claim 1, wherein a difference  $\Delta n$  between an effective refractive index  $n_1$  of said current injection region in the film stacking direction and an effective refractive index  $n_2$  of said current non-injection region in the film stacking direction is in a range of  $0.007 \leq \Delta n = (n_1 - n_2) \leq 0.012$ .

6. A semiconductor laser light emitting device according to claim 2, wherein a difference  $\Delta n$  between an effective refractive index  $n_1$  of said current injection

region in the film stacking direction and an effective refractive index  $n_2$  of said current non-injection region in the film stacking direction is in a range of  $0.007 \leq \Delta n = (n_1 - n_2) \leq 0.012$ .

7. A semiconductor laser light emitting device according to claim 3, wherein a difference  $\Delta n$  between an effective refractive index  $n_1$  of said current injection region in the film stacking direction and an effective refractive index  $n_2$  of said current non-injection region in the film stacking direction is in a range of  $0.007 \leq \Delta n = (n_1 - n_2) \leq 0.012$ .

8. A semiconductor laser light emitting device according to claim 4, wherein a difference  $\Delta n$  between an effective refractive index  $n_1$  of said current injection region in the film stacking direction and an effective refractive index  $n_2$  of said current non-injection region in the film stacking direction is in a range of  $0.007 \leq \Delta n = (n_1 - n_2) \leq 0.012$ .

9. In a semiconductor laser light emitting device comprising:

a stacked film composed of a stack of group III nitride semiconductor films each containing at least one kind selected from aluminum, gallium, indium, and boron; wherein an upper portion of said stacked film is

49  
formed into a ridge-like stripe, to form a current injection region;

a current non-injection region formed on both sides of said ridge-like stripe; and

at least part of said current non-injection region is made from a material expressed by a chemical formula  $\text{Al}_x\text{Ga}_{1-x}\text{N}$  ( $0 \leq x \leq 1.0$ );

the improvement wherein

the component ratio "x" of Al is specified at a value in a range of  $0.15 < x < 0.30$ , so that said semiconductor laser light emitting device is configured as a weak index type pulsation semiconductor laser light emitting device.

10. A semiconductor laser light emitting device according to claim 9, wherein a current injection width  $W_{st}$  of said current injection region is specified at a value in a range of  $1 \mu\text{m} \leq W_{st} \leq 3 \mu\text{m}$ .

Sub B7  
11. A semiconductor laser light emitting device according to claim 9, wherein part, present between an active layer and said current non-injection region, of said stacked film under said current non-injection region at least includes a film which is made from a material expressed by a chemical formula  $\text{Al}_x\text{Ga}_{1-x}\text{N}$  ( $0.15 < x < 0.30$ ) and which has a thickness of  $0.2 \mu\text{m}$  or less.

12. A semiconductor laser light emitting device according to claim 10, wherein part, present between an active layer and said current non-injection region, of said stacked film under said current non-injection region at least includes a film which is made from a material expressed by a chemical formula  $\text{Al}_x\text{Ga}_{1-x}\text{N}$  ( $0.15 < x < 0.30$ ) and which has a thickness of  $0.2 \mu\text{m}$  or less.

13. A semiconductor laser light emitting device according to claim 9, wherein a difference  $\Delta n$  between an effective refractive index  $n_1$  of said current injection region in the film stacking direction and an effective refractive index  $n_2$  of said current non-injection region in the film stacking direction is in a range of  $0 < \Delta n = (n_1 - n_2) < 0.007$ .

14. A semiconductor laser light emitting device according to claim 10, wherein a difference  $\Delta n$  between an effective refractive index  $n_1$  of said current injection region in the film stacking direction and an effective refractive index  $n_2$  of said current non-injection region in the film stacking direction is in a range of  $0 < \Delta n = (n_1 - n_2) < 0.007$ .

15. A semiconductor laser light emitting device according to claim 11, wherein a difference  $\Delta n$  between an effective refractive index  $n_1$  of said current injection

region in the film stacking direction and an effective refractive index  $n_2$  of said current non-injection region in the film stacking direction is in a range of  $0 < \Delta n = (n_1 - n_2) < 0.007$ .

16. A semiconductor laser light emitting device according to claim 12, wherein a difference  $\Delta n$  between an effective refractive index  $n_1$  of said current injection region in the film stacking direction and an effective refractive index  $n_2$  of said current non-injection region in the film stacking direction is in a range of  $0 < \Delta n = (n_1 - n_2) < 0.007$ .

17. In a semiconductor laser light emitting device comprising:

a stacked film composed of a stack of group III nitride semiconductor films each containing at least one kind selected from aluminum, gallium, indium, and boron;

wherein an upper portion of said stacked film is formed into a ridge-like stripe, to form a current injection region;

a current non-injection region formed on both sides of said ridge-like stripe; and

at least part of said current non-injection region is made from a material expressed by a chemical formula  $\text{Al}_x\text{Ga}_{1-x}\text{N}$  ( $0 \leq x \leq 1.0$ );

A3  
the improvement wherein

the component ratio "x" of Al is specified at a value in a range of  $0 \leq x \leq 0.15$ , so that said semiconductor laser light emitting device is configured as a gain guide type laser light emitting device.

18. A semiconductor laser light emitting device according to claim 17, wherein a current injection width Wst of said current injection region is specified at a value in a range of  $1 \mu\text{m} \leq \text{Wst} \leq 3 \mu\text{m}$ .

Sub B7  
19. A semiconductor laser light emitting device according to claim 17, wherein part, present between an active layer and said current non-injection region, of said stacked film under said current non-injection region at least includes a film which is made from a material expressed by a chemical formula  $\text{Al}_x\text{Ga}_{1-x}\text{N}$  ( $0 \leq x \leq 0.15$ ) and which has a thickness of  $0.2 \mu\text{m}$  or less.

20. A semiconductor laser light emitting device according to claim 18, wherein part, present between an active layer and said current non-injection region, of said stacked film under said current non-injection region at least includes a film which is made from a material expressed by a chemical formula  $\text{Al}_x\text{Ga}_{1-x}\text{N}$  ( $0 \leq x \leq 0.15$ ) and which has a thickness of  $0.2 \mu\text{m}$  or less.

21. A semiconductor laser light emitting device

according to claim 17, wherein a difference  $\Delta n$  between an effective refractive index  $n_1$  of said current injection region in the film stacking direction and an effective refractive index  $n_2$  of said current non-injection region in the film stacking direction is in a range of  $0 < \Delta n = (n_1 - n_2) < 0.007$ .

22. A semiconductor laser light emitting device according to claim 18, wherein a difference  $\Delta n$  between an effective refractive index  $n_1$  of said current injection region in the film stacking direction and an effective refractive index  $n_2$  of said current non-injection region in the film stacking direction is in a range of  $0 < \Delta n = (n_1 - n_2) < 0.007$ .

23. A semiconductor laser light emitting device according to claim 19, wherein a difference  $\Delta n$  between an effective refractive index  $n_1$  of said current injection region in the film stacking direction and an effective refractive index  $n_2$  of said current non-injection region in the film stacking direction is in a range of  $0 < \Delta n = (n_1 - n_2) < 0.007$ .

24. A semiconductor laser light emitting device according to claim 20, wherein a difference  $\Delta n$  between an effective refractive index  $n_1$  of said current injection region in the film stacking direction and an effective



refractive index  $n_2$  of said current non-injection region  
in the film stacking direction is in a range of  $0 < \Delta n =$   
 $(n_1 - n_2) < 0.007$ .